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Cultural factors: Understanding culture to design organisational structures and systems to optimise safety

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Abstract

Safety culture is a term with numerous definitions in the literature. Many authors advocate a prescriptive approach to safety culture in which if an organisation has certain levels of externally prescribed systems and structures in place it has a 'good safety culture'. Conversely, other researchers suggest an anthropological approach of exploring deep meanings and understandings present within an organisation's workforce. In a recent published review, the authors presented an alternative view to safety culture, in which the anthropological aspects of safety culture interact with the structures and systems in place within an organisation to result in behavioural patterns. This can be viewed as a human factors approach to safety culture in which, through understanding the specific interactions between the culture of a workforce and external organisational elements, organisational structures and systems can be optimised in order to shape worker behaviour and improve safety. This paper presents findings from a recent investigation of safety culture in the Australian heavy vehicle (transport) industry. Selected results are discussed to explore how understanding culture can provide direction to the optimisation of organisational structures and systems to match worker culture and thus improve safety. Specifically the value placed on personal experience and stories, as well as on both time and money are discussed, and interventions that are suited to these aspects of the culture are discussed. These findings demonstrate the importance of shifting beyond mere prescriptive and interpretive approaches to safety culture and instead to focus on the interaction between cultural and contextual elements to optimise organisational structures and systems.

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Keywords: Safety culture; Human factors; Safety communication; Transport

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1. Introduction

Safety culture is typically conceptualised as organisational structures and systems, shared beliefs, attitudes, and values or a combination of the two [1,2]. The most common approach to safety culture, which has been referred to as a functionalist [1,2], normative [1,3] or instrumental [4] approach, generally emphasises aspiring toward a good or strong safety culture, which can be measured through the presence and level of various organisational characteristics, or perceptions of management characteristics, values and practices. This measurement occurs through safety culture and safety climate surveys which examine the perceived level and quality of factors such as safety communication in the workplace, management support and attitudes, training, level of risk at the workplace and work pressure [5,6,7]. Guldenmund [5] argued that the main factors examined in such surveys "can be ascribed to mostly affective evaluations of the workforce about its management" (p.734). It follows that increasing certain management efforts directed toward safety, such as the level of training, these evaluations would shift, resulting in a strong safety culture leading to improved safety performance. Cooper [8] explicitly states this by saying "the creation of a safety culture imply becomes a super-ordinate goal, that is achieved by dividing the task into a series of sub-goals that are intended to direct people's attention towards the management of safety" (p.116). However, the relationship between improved safety performance and higher scores on safety culture and climate surveys is not strongly supported by evidence [5].

Another common approach to safety culture, referred to as an interpretive [2] or anthropological [1] approach, views culture as shared patterns of meanings, or a series of shared beliefs, attitudes and values. While this approach is common in definitions of safety culture, there is little published research examining safety culture with this approach. In one example, Hopkins [9] reported on an Australian coal mine disaster showing that a tendency to rely on personal experience and an ingrained tendency for denial led to the disaster. The proposed and enacted solution in this instance was a more structured decision making process to prevent future incidents. In another example, Pidgeon [10] discussed institutional vulnerability providing example solutions of monitoring in the aviation industry. In both cases, culture is seen as a potential threat to be designed out of the work system. This designing out approach stems largely from a lack of support for the idea that cultural beliefs, attitudes and values can be deliberately change [2,4]. However, designing systems which are culture proof may be difficult, as many existing understandings need to be in place to ensure the system works as intended. For example in aviation monitoring there needs to be agreements regarding who can see report data, what level of confidentiality there is, what warrants discipline etc. [10].

Common approaches to safety culture thus fall into one of two options, either advocating the diagnoses of current perceptions of safety management and improving weaknesses, or trying to understand cultural beliefs, attitudes and values as a cause of disaster and then designing culture proof systems. However, these two approach fail to account for one key aspects of culture, which was identified by Guldenmund [11] when he stated that culture is used to "interpret experience and generate behaviour" (p.1472). As has been recognised in health education research standardised education interventions can have differing effects on populations due to the effect of cultural values and norms [12]. In a recent review [1], the authors presented a third approach to safety culture, combining the anthropological and normative approaches, in which culture (seen as shared beliefs, attitudes and values) interacts with organisational structures and systems to result in behavioural patterns. The key distinction in this approach is not that both culture and organisational structures and systems are considered targets for measurement and understanding, but that understanding the interaction between these two categories of factors may provide a greater understanding of safety performance. This approach shows close resemblance to the International Ergonomics Association's [13] definition of human factors and ergonomics as the scientific discipline concerned with the understanding of the interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimise human well-being and overall system performance. That is, in this approach to safety culture, it can be understood that safety culture is a form of group level human factors, in which the goal is understanding the interactions between the shared psychological characteristics of a group (culture) and other elements of the work system in order to design organisational structures, systems and management which optimise safety performance. The present paper provide examples of how understanding culture can provide direction for optimising safety performance by discussing selected findings from a recent investigation of the culture of the Australian heavy vehicle (transport) industry.

2. Method

A series of case studies, consisting of interviews and observations, were conducted with Australian transport organisations in order to explore the effect of culture on safety. The current paper reports findings from two of these organisations.

2.1. Participating organisations

2.1.1. Company A

Company A was a medium sized family owned and operated transport company. The organisation employed approximately 100 staff and owned over 50 prime movers (trailer-truck towing units). The organisation carried general goods both locally and between the capital cities of Australia. A large proportion of their freight came from a single regular customer. A total of 10 organisational staff were interviewed (two managers, one health and safety officer, one operations staff members and six drivers) and six drivers were observed.

2.1.2. Company B

Company B was a medium sized transport company, employing approximately 100 staff members with over 50 trucks. This organisation had a number of branches transporting different goods. The goods carried by Company B ranged from heavy haulage and long loads, to the carriage of construction materials and smaller consumption goods, and were transported both intra- and interstate over long distances and locally. Due to the diversity within Company B, the organisation had a number of managers overseeing branches within the company. Company B had a number of major customers rather than a single customer. A total of 10 organisational staff were interviewed (one compliance officer and part owner of the company, two regional managers who each oversaw approximately half of the total fleet, five branch or depot managers, two trainers, and an operational manager) and eight drivers participated in observations.

2.2. Data collection

Data was collected through the use of semi-structured interviews and participant- observations. The interviews lasted between 30 mins and 2 hours and covered a variety of topics. The first questions were typically aimed at eliciting information regarding the history of the individual as well as identifying hazards and risks within the industry. Later questions sought to identify contextual, cultural, and behavioural factors that influence risk. The researcher would also, on occasion, directly inquire about specific behaviours and outcomes which had not been discussed. Finally, it is worth noting that as the researcher developed a greater awareness of safety within the industry, he would occasionally anonymously share information given by industry members as a way to intentionally seek confirming or contrasting evidence. Typically, only minor prompts were required, as participants appeared eager to share their perspective on safety. As such, prompts to discuss different behaviours and outcomes often gained sufficient information when used with minimal encouragers and requests for further detail.

Participant observation is a common method used within ethnography. The participant-observer model used by ethnographers relies on an interactive relationship between the observer and the observed, and is conducted in the naturalistic setting [14,15]. In this research, observations of drivers were conducted lasting the duration of a usual shift. As such, the observations lasted between four and fifteen hours, with the exception of two observations which lasted only two hours as the researcher was delivered to another depot for further interviews and observations. During the observations the researcher conducted informal interviews. These interviews were similar in nature to the staff member interviews, with drivers being asked to list the major hazards which they face, detail the behaviours required to avoid these hazards, and why they (or other drivers) would or would not complete these activities. Additionally, the researcher was able to ask questions specifically related to the tasks witnessed.

2.3. Data analysis

After the collection of data, recorded interviews were transcribed by a professional transcriber, and checked for accuracy by the researcher. The transcripts and observation notes were then entered into NVivo and analysed using the grounded theory analysis techniques outlined by Corbin and Strauss [16]. Due to the pre-existing framework of safety culture, open coding categorised data according to contextual, cultural, and behavioural categories. Axial coding then identified themes within these categories and further sub-themes. Finally, selective coding was conducted, during which the relationship between cultural and contextual variables and behaviour was identified. This analysis revealed a series of cultural beliefs, attitudes, and values shared by members of each organisation and identified key contextual factors which interact with this culture to shape the identified behaviours and safety outcomes.

3. Results and discussion

There were a number of beliefs attitudes and values identified in the study which were not only shared within a company, but across all the studied organisations. These appeared to represent what could be an industry-wide culture. For the purpose of the current paper, which seeks to provide examples of applying a human factors mindset to understanding safety culture, three of these cultural factors will be discussed. The first is the value placed on experience and stories, while the latter two, which will be discussed together, are the value placed on time and the value placed on money.

3.1. The value placed on experience and stories

In almost every discussion regarding a safety matter, drivers would recall either their own experience or stories of other drivers. Drivers did not view behaviour as unsafe if their own experience and stories of others suggest otherwise. This emphasis on experience and stories may relate to the fact that, until recently, there has been little focus on safety within the heavy vehicle industry. It was stated by one Company B manager, that due to the lack of emphasis on safety in past years, drivers would typically only learn about safety from the advice of friends. The value placed on stories and experience may, therefore, be an artefact of this being the only source of advice in past years.

It wouldn't even be the last 20 years where there's been a big focus on safety and I'm not saying it's wrong I totally agree with it. But before that, like when I was driving... your mate might come along to you and say 'oh just be careful tying that down it might slip' and that sort of thing but there's no real focus on safety. (Company B Region Manager Two)

A number of drivers suggested that their own behaviour was motivated by past experience or stories of others. For example, one Company A driver indicated that as a result of a collision with a drunk car driver, he would never again drink and drive. Within company A, this learning style was particularly important for the use of seatbelts, as every driver had stories of people who would have died if they were wearing a seatbelt. This reliance on experience and stories extended beyond typical safety concerns within the industry. For example, one Company B driver cited their own experience of heart surgery as the reason he needs to watch his health. Another Company B driver related a story of a friend who suffered sciatic nerve damage and was *told never to drive with his wallet in his pocket*. The driver said that upon hearing the doctor's recommendation to his friend, *I thought 'well I'll practice that'*. Non-safety related experiences were also seen to motivate behaviour. One Company A driver stated that his own experience of punishment leads him to wear a seatbelt even though he has *had a few friends crash without a seatbelt and said that if they were wearing it they would be dead; I just hope I never have to find out*.

Experiential learning is by nature retrospective. As stated by one Company B manager that *it's not until an incident happens that a driver goes oh shit and they start to see the bigger picture of it.* Nonetheless, major incidents are not required to learn from experience. Near misses and close calls can also be significant source of learning. For example, a number of drivers suggested that close calls have taught them how to judge and manage fatigue. Further, even when an incident occurs there needs to be a lesson in the experience in order for learning to occur. For example, one Company A driver discussed a fatigue-related incident in which he awoke with the truck in a highway-

side gutter. In this case, the driver was unable to take any lesson from the experience as, as far as he knew, he had received adequate rest and was prepared for the journey. Despite the potential for false or inaccurate stories, drivers often adhered to them.

I have had a few near misses when tired, never a fatal though. A fair bit of that is luck. It's not that I'm a better driver than others, just lucky to pull out of the near miss, then you think '…I gotta sleep'. Those experiences help you judge your fatigue. For me, it is speed. If I start slowing down and can't keep it at 100km that's my first sign. (Company A Driver Six)

3.1.1. Using stories to optimise safety performance

The finding that drivers primarily learn through personal experience and stories coincides well with past research. The tendency to place personal experience over rules or reported truths is also observed within both the truck safety literature [17] and the safety culture literature [9,18]. Experiential and narrative learning was seen as a frustration by many managers. When warning drivers that a given behaviour would result in injury, it was common for managers to state that drivers would argue that they have been doing things 'this way since before you were born' and never had a problem. In this case, if we were using the normative approach to safety culture and simply tried to increase communication and training it would have little result. Similarly, when discussing the anthropological approach, it was noted that the problem of reliance on personal experience was addressed by rigid decision making rules in the previously referenced Australian coal mine disaster [9]. However, this would also be ineffective in this instance, as the autonomy of truck drivers means that it is difficult to monitor compliance so there is little benefit to instituting more rules. However, rather than viewing this aspect of culture as a barrier to overcome, due to the importance placed on stories and experience, the use of stories may serve as a vital path by which to improve safety within the industry.

Within Company A, safety communication and training typically focused on explaining rules and telling drivers that they could get injured if they do not comply. As indicated above, however, this approach encountered direct resistance due to the drivers' experience and stories they had heard. Conversely, Company B made use of serious occurrence reports (SORs) in regular toolbox meetings to great effect. SORs were detailed reports of incidents that had occurred in related industries, other branches of the company, or at a customer site. Drivers who participated in the observations indicated that the use of SORs was effective in raising awareness and beneficial in helping them to learn about their job. One Company B driver stated that the use of these reports *makes you more aware* and that *you are always leaning, you can learn from incidents whether they happen at the workplace or elsewhere*. This driver indicated that it was because of SORs that *toolbox meetings are good, you hear of things and you think we're lucky we follow the policies*. In this instance, the use of stories aided drivers to construct views of safety that aligned with rules and regulations. Because of this, polices were more likely to receive compliance. As stated by one Company B Driver, *I don't take chances we just do everything in accordance with what we're supposed to do at [Company B]*. Similarly, another Company B driver stated that *at the end of the day you just want to go home, so if you follow the policies and procedures everything should happen*. Thus, Company B's approach to communication and training can be seen to align with the existing culture of the industry, and thus was effective in improving safety compliance.

We have a toolbox meeting once a month religiously… and we go through those SSOs. If there's none, there's none, if there is… we try to incorporate it into our day to days… And so the drivers yeah they do take it on board because I do have a lot of drivers come into me and say you know like that guy was lucky and there's a bit of talk about it amongst the ranks. (Company B Branch Manager Five)

3.2. The value placed on time and money

Drivers in the studied organisations placed a high value on time. Within Company A it was recognised that the desire to save time specifically influences speeding. It was often suggested that drivers will speed to make up time lost to delays. Whilst typically occurring when running off hills, alarmingly, drivers reportedly may also hold higher speeds through small towns. Additionally, a number of drivers noted that they will not accurately complete pre-trip vehicle inspection as they take too long.

And it's the same as truck drivers that have been stuffed around for the last hour by someone so they just hold it flat through a village to make up that time... So you know speeding not so much you know a lot of the highway is a hundred but through the towns and that it is somewhat of an issue because blokes like to make up time so of course they speed through towns. (Company A Manager One)

This desire to save time was evident even when there was no benefit to faster work. On one observation, a Company A driver stated that they would assist in unloading the vehicle (which was against policy) because *it takes too long otherwise*. After giving significant assistance to the unloaders, the driver and researcher waited approximately four hours until the goods for the return-journey arrived and could be loaded onto the truck. In this case, the driver opted to make significant effort to speed up the unloading process, despite acknowledging that the long wait after unloading was expected and occurred every time the same run is conducted. This was evident to a lesser degree within Company B, but was still present.

Like most people, truck drivers from the two companies were also strongly motivated by money. Comments regarding the motivating effect of money, however, often attributed this as a problem for 'other drivers'. As stated by one Company A driver, *some people push it for an extra run to get money*. This was particularly relevant for fatigue management. One Company A driver stated that an organisation can *ask a driver if they are fit for duty and they will say they are right just because they want the money, but then they might make a wrong decision because they are tired*. Similarly, one Company B driver stated that, whilst it is commonly said that you shouldn't *do anything that will need drugs* to stay awake, drivers may use drugs if they've *got a family and house payments wanting you to make a mile*.

3.2.1. Using the value placed on money to promote safety and overcome the value placed on time

In this instance, relying on the idea of increased management activities, associated with common approaches to safety culture, does not truly fit the problem. For example, increasing or decreasing pay would both have negative impacts, either through more need to increase weekly earnings due to insufficient pay, or an even higher incentive to work when not fit for duty. Though, one such approach that does hold merit is to increase the use of reward and punishment systems. This is common in many industries and needs little discussion. However, it is important to note that due to the lack of financial freedom experienced by many members of the industry, it was indicated that financial punishments in particular can be very effective.

Because a lot of blokes that drive trucks live week to week. I suppose that's got a bit to do with the fact they spend so much money buying food up and down the road all the time… Anyway you know if you give them a week's suspension without pay it kills them mate. Really hurts them because like I said they live week to week. So it's normally once is enough. (Company A Manager One)

Using the anthropological approach of designing a culture proof work system could also have some benefits. For example, it was noted that the value placed on time was often an incentive to skip proper vehicle inspections as they were seen as a waste of time. Paying a separate mechanically trained staff member to solely inspect vehicles could not only circumvent this problem but result in a higher quality of vehicle inspection. However, this only accounts for one aspect of the problem.

If we were to again use a human factors mindset to understanding the interaction between culture and the work system, however, there is another simple and potentially obvious approach. Drivers from Company A are employed on a permanent basis, yet this only serves as a minimum wage for the drivers. In reality local drivers were paid in $/hour and long-distance drivers were paid in cents/km. If this alternate rate exceeds their permanent wage, they receive the distance or hourly rate. Because of this, one Company A driver stated that *on local, time doesn't matter coz you're paid by the hour; line-haul you want to get finished and get to bed to have your long break*. That is, payment by the hour provides no incentive to be quicker and in fact encourages taking longer to do the same journey. However, when paid by the kilometre, it is beneficial to travel the same distance in less time to either allow for additional journeys and more money, or to make the same money with less time investment. Unlike Company A, all of Company B's drivers are paid by the hour. Thus, as could be expected, Company B drivers placed a lower priority on time. Two drivers particularly emphasised this, one stating that *they pay by the hour so you're not really rushed* and the other, *why bother rushing when you are paid by the hour?* Thus, the manner in which drivers are paid either increased or decreased the value they placed on time.

And the thing about (Company B) where the drivers don't have to push the limit is our drivers that go away are paid by the hour. Whereas a lot of companies pay by the trip or by the kilometre or others, whereas (Company B) it's by the hour. So the driver doesn't have to force himself to do the trip a little bit quicker so his pay packet looks a little bit better. And that's a lot of the problem with our industry. (Company B Region Manager Two)

Despite being paid an hourly rate, however, some drivers still placed significant value on time. This may be the result of a history driving under different payment methods. However, it was indicated by two drivers that some individuals simply want to spend as little time working as possible to get home sooner. Thus, even within Company B there still appeared to be a subgroup that placed a high value on working quickly.

We are paid overtime so there's no use rushing. I know some of the drivers will work during their breaks to get home. I tell them they're mad; it's just giving the company money. (Company B Driver One)

Some other drivers just wanna have a whinge. Sometimes you drive around all day and the last drop is just near the depot. Some whinge about time. So what? I get some overtime. Some just want their hours and to go home. (Company B Driver Two)

In the case of the value placed on time and money, it can again be seen that understanding culture can provide direction for the design of organisational systems to improve safety. In this case, despite both time and money providing strong incentives for unsafe behaviour, one of these values could be utilised through the correct payment methods, in order to reduce the negative consequences of both values and improve safety. This is not a new concept, and payment by the hour has been advocated by some industry groups as a safer method of payment. However, it is important to note that even simple solutions to safety issues such as this do not fit within typical approaches to safety culture. That is to say, common approaches to safety culture do not involve the consideration of how culture and organisational structures truly interact and thus do not lead to safety solutions that involve shaping the organisational system to match with the existing culture of a workforce to improve safety. Additionally, it shows the ability to provide support for or against proposed intervention approaches by exploring and understanding culture. However, it should again be noted that it may not be possible to completely gain the desired results. As was stated, even in one company that solely paid by the hour, the desire to save time still had an influence on some drivers.

4. Conclusion

Common approaches to safety culture typically either advocate increasing perceptions of management commitment to safety through organisational structure and systems or identifying cultural beliefs, attitudes and values as a cause of disaster. These approaches, while beneficial, do not place due emphasis on the interactions between culture and workplace structures and systems. By employing a human factors mindset to the exploration of safety culture it is possible to identify means by which to design organisational structures and systems to optimise safety performance. This paper presented two examples of cultural values within the Australian heavy vehicle industry and how the systems in place in the two highlighted organisations were differentially suited to these values. Future safety culture research could benefit from taking a similar approach not bound to common singularly focussed conceptualisations of safety culture.

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